

WHAT IS CLAIMED IS:

1. A method of predicting a life of a rolling bearing having a specification which a basic dynamic load rating C and a basic static load rating C_0 are calculable,

5 wherein, when a dynamic equivalent load is P, a load index is p, a viscosity ratio of a lubricant is κ , a contamination degree coefficient is a_c , a fatigue limit load is P_u , and a life correction coefficient is a_{NSK} , a corrected rating life L_A of the rolling bearing at a certain reliability coefficient a_1 is calculated by:

$$L_A = a_1 \cdot a_{NSK} \cdot (C/P)^p$$

$$a_{NSK} \propto f[F(\kappa), \{(P - P_u)/C\} \cdot 1/a_c].$$

15 2. The method according to claim 1, wherein a material coefficient a_m is applied to the contamination degree coefficient a_c as a degree of influence of steel at which the life is prolonged by a component of the steel and a heat treatment, and the contamination degree coefficient a_c is calculated by:

$$20 \quad a_c = g(a_m, a_c).$$

3. The method according to claim 1, wherein a function $F(\kappa)$ of the viscosity ratio κ is set as a lubrication parameter a_L , and

25 wherein the life correction coefficient a_{NSK} is

calculated on the basis of the lubrication parameter a_L
and a load parameter $\{(P - P_u)/C\} \cdot 1/a_c$.

4. An apparatus for predicting a life of a rolling
5 bearing having a specification which a basic dynamic load
rating C and a basic static load rating C_0 are calculable,
comprising:

10 a data information inputting means for inputting
data information including the basic dynamic load rating
 C and the basic static load rating C_0 of said rolling
bearing;

15 a dynamic equivalent load calculating means for
calculating a dynamic equivalent load on the basis of the
data information input by said data information inputting
means;

a reliability setting means for setting a
reliability coefficient;

20 a lubrication parameter calculating means for
calculating a lubrication parameter on the basis of the
inputting data information;

a contamination degree setting means for setting a
contamination degree;

a fatigue limit load calculating means for
calculating a fatigue limit load;

25 a load parameter determining means for determining a

load parameter on the basis of the basic dynamic load,
the dynamic equivalent load, the fatigue limit load, and
the contamination degree coefficient;

a life correction coefficient setting means for

5 setting a life correction coefficient on the basis of the
lubrication parameter and the load parameter; and

a bearing life calculating means for calculating the
life of the bearing on the basis of the reliability
coefficient, the life correction coefficient, the basic
dynamic load rating, the dynamic equivalent load, and a
load index.

5. The apparatus according to claim 4, wherein
said contamination degree setting means sets a
15 contamination degree coefficient in view of a material
coefficient as a degree of influence of steel at which
the life is prolonged by a component of the steel and a
heat treatment.

20 6. The apparatus according to claim 5, wherein
said life correction coefficient setting means calculates
the life correction coefficient on the basis of the load
parameter and the lubrication parameter and with
reference to a life correction coefficient calculation
25 map which indicates relationships among values of the

parameters and the life correction coefficient with using the lubrication parameter as a parameter.

7. The apparatus according to claim 4, wherein
5 said lubrication parameter calculating means calculates a viscosity ratio κ which is a ratio of a kinematic viscosity ν of a used lubricant at an operating temperature to a required viscosity ν_1 at the operating temperature, from an operating kinematic viscosity ν of the used lubricant, a mean diameter d_m of said bearing, and a rotation number N of said bearing.

8. The apparatus according to claim 7, wherein
said life correction coefficient setting means calculates
15 the life correction coefficient on the basis of the load parameter and the lubrication parameter and with reference to a life correction coefficient calculation map which indicates relationships among values of the parameters and the life correction coefficient with using
20 the lubrication parameter as a parameter.

9. The apparatus according to claim 4, wherein
said life correction coefficient setting means calculates
the life correction coefficient on the basis of the load
25 parameter and the lubrication parameter and with

reference to a life correction coefficient calculation map which indicates relationships among values of the parameters and the life correction coefficient with using the lubrication parameter as a parameter.

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10. The apparatus according to claim 4, further comprising:

an exhibiting means for exhibiting the life of the bearing which is calculated by said bearing life calculating means.

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11. An apparatus for predicting a life of a rolling bearing having a specification which a basic dynamic load rating C and a basic static load rating C_0 are calculable, comprising:

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a data information inputting means for inputting data information including the basic dynamic load rating C and the basic static load rating C_0 of said rolling bearing;

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a dynamic equivalent load calculating means for calculating a dynamic equivalent load on the basis of the data information input by said data information inputting means;

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a reliability setting means for setting a reliability coefficient;

a lubrication parameter calculating means for calculating a lubrication parameter on the basis of the inputting data information;

5 a contamination degree setting means for setting a contamination degree;

a fatigue limit load calculating means for calculating a fatigue limit load;

10 a load parameter determining means for determining a load parameter on the basis of the basic dynamic load, the dynamic equivalent load, the fatigue limit load, and the contamination degree coefficient;

15 a life correction coefficient setting means for setting a life correction coefficient on the basis of the lubrication parameter and the load parameter;

a bearing life calculating means for calculating the life of the bearing on the basis of the reliability coefficient, the life correction coefficient, the basic dynamic load rating, the dynamic equivalent load, and a load index; and

20 a recalculation judging means for judging whether, when a calculation result of said bearing life calculating means fails to coincide with a desired life, a recalculation for making the calculation result coincident with the desired life is required or not.

12. The apparatus according to claim 11, wherein
said contamination degree setting means sets a
contamination degree coefficient in view of a material
coefficient serving as a degree of influence of steel at
5 which the life is prolonged by a component of the steel
and a heat treatment.

13. The apparatus according to claim 12, wherein
said life correction coefficient setting means calculates
10 the life correction coefficient on the basis of the load
parameter and the lubrication parameter and with
reference to a life correction coefficient calculation
map which indicates relationships among values of the
parameters and the life correction coefficient with using
15 the lubrication parameter as a parameter.

14. The apparatus according to claim 11, wherein
said lubrication parameter calculating means calculates a
viscosity ratio κ which is a ratio of a kinematic
20 viscosity ν of a used lubricant at an operating
temperature to a required viscosity ν_1 at the operating
temperature, from an operating kinematic viscosity ν of
the used lubricant, a mean diameter d_m of said bearing,
and a rotation number N of said bearing.

15. The apparatus according to claim 14, wherein
said life correction coefficient setting means calculates
the life correction coefficient on the basis of the load
parameter and the lubrication parameter and with
reference to a life correction coefficient calculation
map which indicates relationships among values of the
parameters and the life correction coefficient with using
the lubrication parameter as a parameter.

16. The apparatus according to claim 11, wherein
said life correction coefficient setting means calculates
the life correction coefficient on the basis of the load
parameter and the lubrication parameter and with
reference to a life correction coefficient calculation
map which indicates relationships among values of the
parameters and the life correction coefficient with using
the lubrication parameter as a parameter.

17. The apparatus according to claim 11, further
comprising:

an exhibiting means for exhibiting the life of the
bearing which is calculated by said bearing life
calculating means.

18. A rolling bearing selection apparatus using an

apparatus for predicting a life of a rolling bearing,
comprising:

a bearing kind inputting means for inputting a
bearing kind which is desired by a user;

5 a data information inputting means for inputting
necessary data information other than required data
information required by the user, from necessary data
information including the basic dynamic load rating C and
the basic static load rating C_0 of said rolling bearing;

10 a data information assuming means for comparing the
required data information which is input by said data
information inputting means with said necessary data
information, and assuming data information which is not
input;

15 said life predicting apparatus for predicting a life
of a rolling bearing according to claim 4, which performs
calculation of predicting the bearing life on the basis
of the data information which is input by said data
information inputting means and the data information
20 which is assumed by said data information assuming means;

a judging means for judging whether a calculation
result of said life predicting apparatus satisfies the
data information which is input by said data information
inputting means or not;

25 a data information exhibiting means for, when a

judgement result of said judging means indicates that the calculation result satisfies the data information, exhibiting the data information which is set by said data information assuming means; and

5 a recalculating means for, when the judgement result of said judging means indicates that the calculation result does not satisfy the data information, changing the data information which is assumed by said data information assuming means, and causing said life
10 predicting apparatus to again perform the calculation.

19. The rolling bearing selection apparatus according to claim 18, wherein at least one of said data
15 information inputting means, said data information assuming means, said life predicting apparatus, said judging means, said data information exhibiting means, and said recalculating means is accessible through an Internet.

20 20. The rolling bearing selection apparatus according to claim 19, further comprising:

a user registration accepting means for accepting user registration through the Internet,

wherein only a user who is registered in said user
25 registration accepting means is allowed to access at

least one of said data information inputting means, said
data information assuming means, said life predicting
apparatus, said judging means, said data information
exhibiting means, and said recalculating means, through
5 the Internet.

21. The rolling bearing selection apparatus
according to claim 19, wherein a language which is
handled in said data information inputting means, said
10 data information assuming means, said apparatus for
predicting a life of a rolling bearing, said judging
means, said data information exhibiting means, and said
recalculating means is selectable.

22. The rolling bearing selection apparatus
according to claim 18, wherein said data information
exhibiting means performs at least one of exhibition of
prediction of the life of the rolling bearing, exhibition
of an optimum bearing, and exhibition of optimum service
15 condition.
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23. The rolling bearing selection apparatus
according to claim 18, wherein said data information
exhibiting means exhibits at least one of prediction of
25 the life of the rolling bearing, an optimum bearing, and

optimum service condition, as image information in which
a parameter is changeable.

24. The rolling bearing selection apparatus

5 according to claim 23, wherein the image information is
displayed as a characteristic diagram in which one axis
indicates a predicted value of the life, and another axis
indicates one selected from a bearing size, a bearing
load, a rotation speed, a kind of a lubricant, a degree
10 of contamination, a service temperature, a material kind,
and a reliability coefficient.

25. The rolling bearing selection apparatus
according to claim 18, further comprising:

15 a delivery information exhibiting means for
exhibiting at least one of a delivery time and an
estimated amount of the rolling bearing based on the data
information exhibited by said data information exhibiting
means.

20 26. A storage medium storing a life prediction
program for predicting a life of a rolling bearing having
a specification which a basic dynamic load rating C and a
basic static load rating C_0 are calculable, said program
25 executing the steps of:

dynamic load rating C and the basic static load rating C_0
of said rolling bearing;

calculating a dynamic equivalent load on the basis
of the data information which is input in said data

5 information inputting step;

setting a reliability coefficient;

calculating a lubrication parameter on the basis of
the data information;

setting a contamination degree;

10 calculating a fatigue limit load;

determining a load parameter on the basis of the
basic dynamic load, the dynamic equivalent load, the
fatigue limit load, and the contamination degree;

15 setting a life correction coefficient on the basis
of the lubrication parameter and the load parameter; and

calculating the life of the bearing on the basis of
the reliability coefficient, the life correction
coefficient, the basic dynamic load rating, the dynamic
equivalent load, and a load index.

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27. A storage medium storing a life prediction
program for predicting a life of a rolling bearing having
a specification which a basic dynamic load rating C and a
basic static load rating C_0 are calculable, said program
25 executing the steps of:

inputting data information including the basic
dynamic load rating C and the basic static load rating C_0
of said rolling bearing;

calculating a dynamic equivalent load on the basis
5 of the data information which is input in said data
information inputting step;

setting a reliability coefficient;

calculating a lubrication parameter on the basis of
the data information;

10 setting a contamination degree;

calculating a fatigue limit load;

determining a load parameter on the basis of the
basic dynamic load, the dynamic equivalent load, the
fatigue limit load, and the contamination degree;

15 setting a life correction coefficient on the basis
of the lubrication parameter and the load parameter;

calculating the life of the bearing on the basis of
the reliability coefficient, the life correction
coefficient, the basic dynamic load rating, the dynamic
20 equivalent load, and a load index; and

judging whether, when a calculation result of said
bearing life fails to coincide with a desired life, a
recalculation for making the calculation result
coincident with the desired life is required or not.

28. A storage medium storing a bearing selection program for selecting a rolling bearing according to a specification required by a user, said program executing the steps of:

5 inputting a bearing kind which is desired by the user;

10 inputting necessary data information other than required data information required by the user, from necessary data information including the basic dynamic load rating C and the basic static load rating C_0 of said rolling bearing;

15 comparing the required data information with the necessary data information to assume data information which is not input;

20 predicting a life by using the life prediction program according to claim 26, on the basis of the required data information and assumed data information other than the required data information;

25 judging whether a result of the life prediction satisfies the required data information or not;

 exhibiting the assumed data information as bearing selection information, when the life prediction result satisfies the required data information; and,

 changing the assumed data information, and causing said life prediction program to again perform the

calculation, when the life prediction result does not
satisfy the required data information.

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